

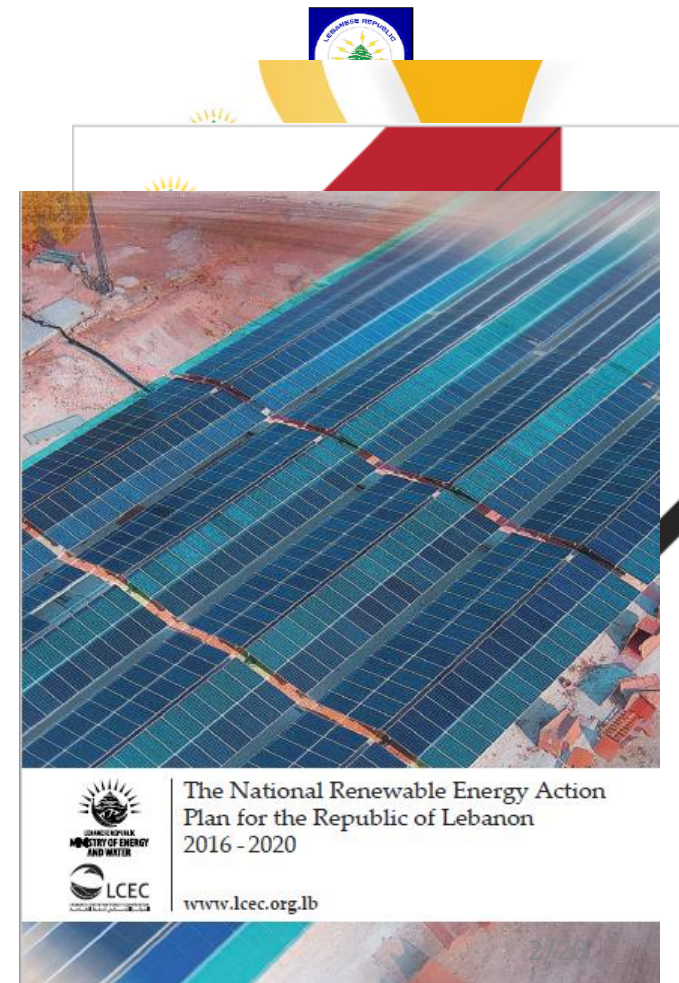
Starting small, growing fast – DRE as a catalyst for RE deployment: Lebanon

By Dr. Sorina Mortada
Technical Consultant

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Policies targeting Energy Efficiency (EE) and Renewable Energy (RE)

- Policy Paper for the Electric Sector 2010
- First National Energy Efficiency Action Plan (NEEAP 2011-2015)
- Second National Energy Efficiency Action Plan (NEEAP 2016-2020)
- National Renewable Action Plan (NREAP 2016-2020)



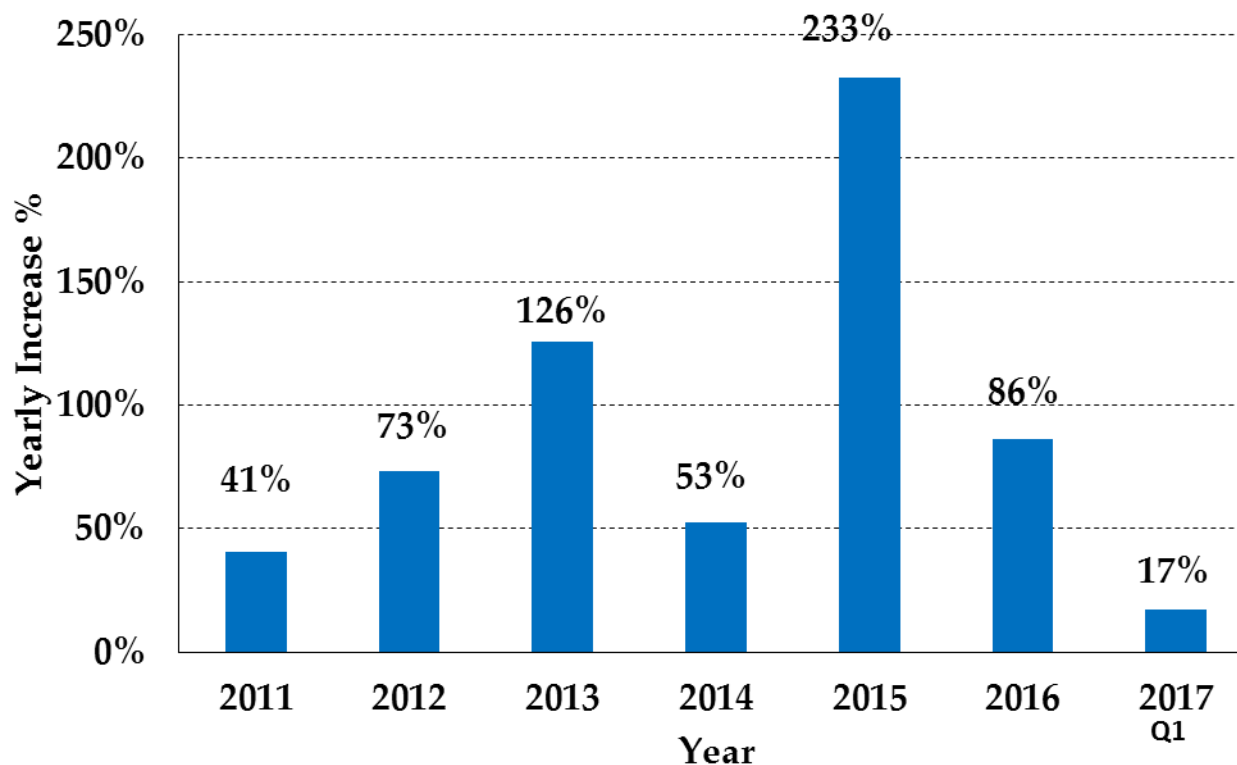
Renewable Energy In Lebanon

- Existing since the 2000s but exponential growth in 2013 with the introduction of the NEEREA mechanism
- Large Scale Plant Installed and Ongoing:
 - ✓ 2 MW Solar PV installed
 - ✓ 200 MW wind farm to be installed soon (under PPA)
 - ✓ 12 PV solar farms of 120-180 MW Solar PV, tender document to be released mid may (under PPA)
 - ✓ 10 public bids in public buildings: MEW 130 kW, directorate of Engineering Lebanese army 150 kWp,....
 - ✓ DREG-CEDRO 2,610 kWp

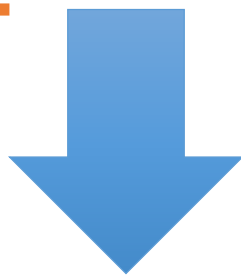
- **NEEREA** financing mechanism Projects
- Solar PV **street Lighting** ~0.8 MWp
- UNDP-CEDRO projects: Ranges between 1.125 kWp and 2.7 kWp. The total capacity installed is around 135.8 kWp.
- UNDP- DREG projects

DRE in Lebanon

- In 2010, Lebanon's DRE mainly Solar PV installed capacity equaled 320 kWp.



- Initiative 11 of NEEAP (2011-2015): Financing Mechanisms and Incentives
- “This initiative aims to provide proper financing mechanism in order to promote the use of energy efficiency and renewable energy. This is mainly linked to the collaborative work with the Ministry of Finance and the Central Bank of Lebanon.”

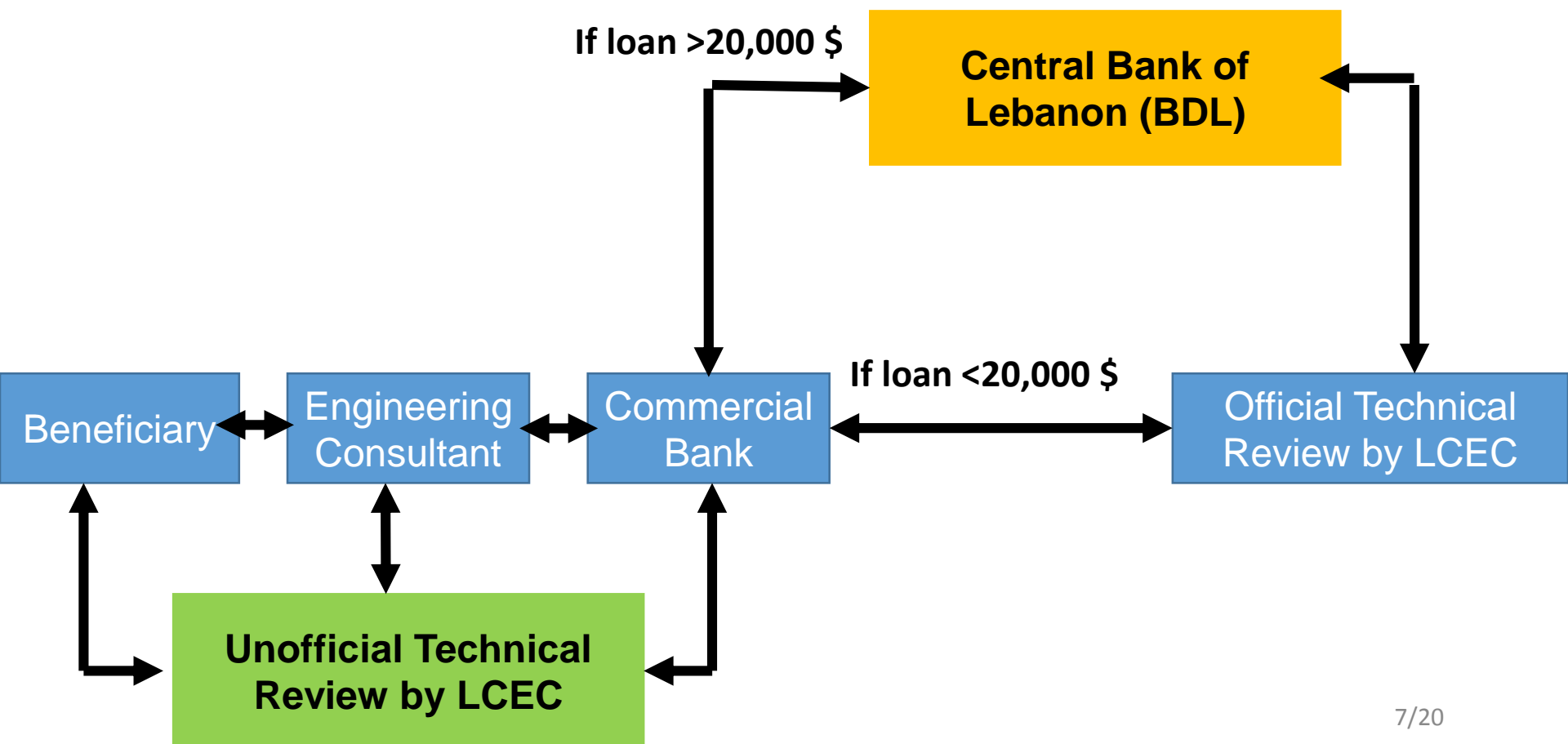


National Energy Efficiency and Renewable Energy Action (NEEREA)

Up to 14 Yrs., 4 Yrs. Grace, Interest Rate 1.075%

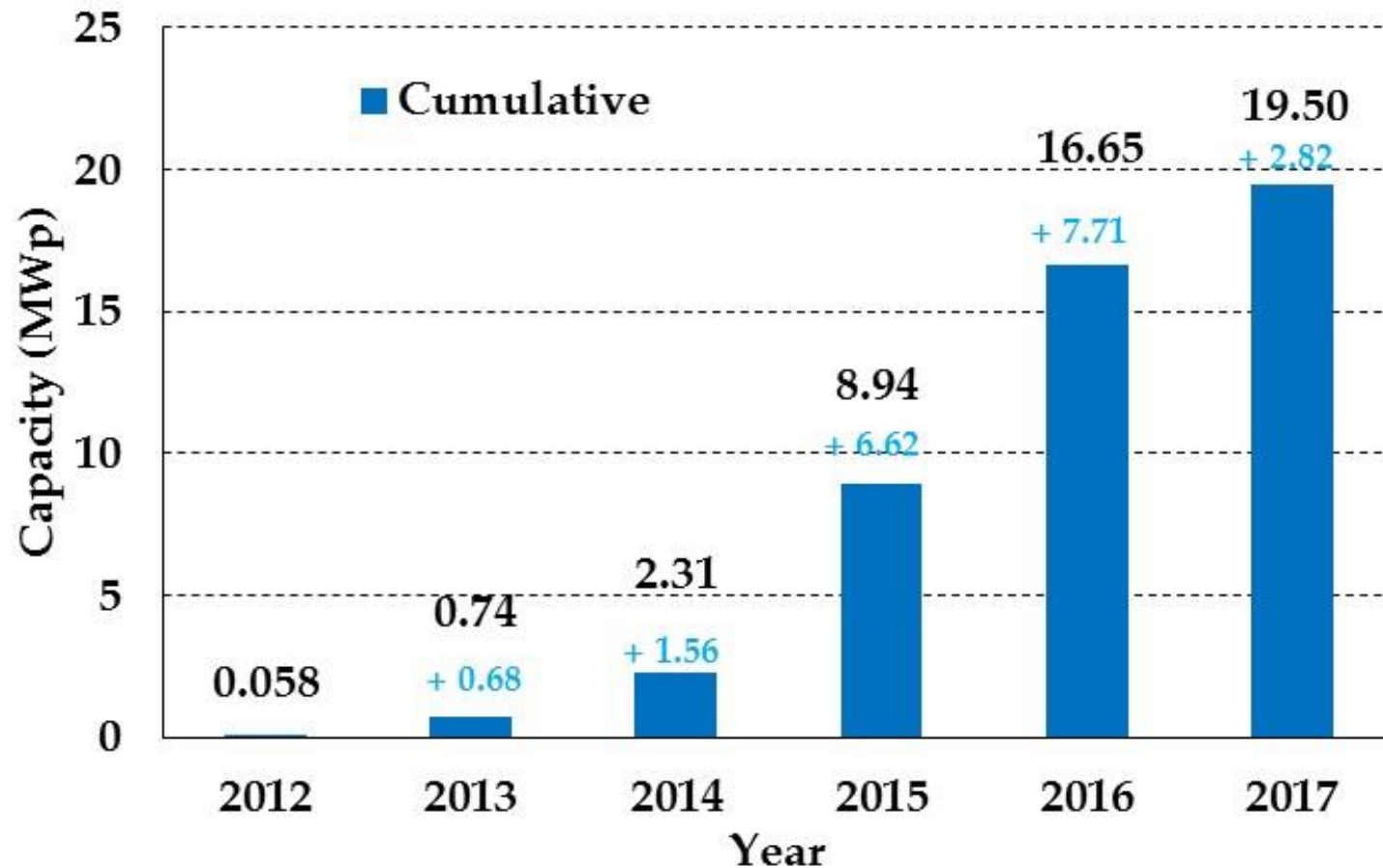
NEEREA

- EE and RE projects
- RE: PV, SWH, Biomass,...



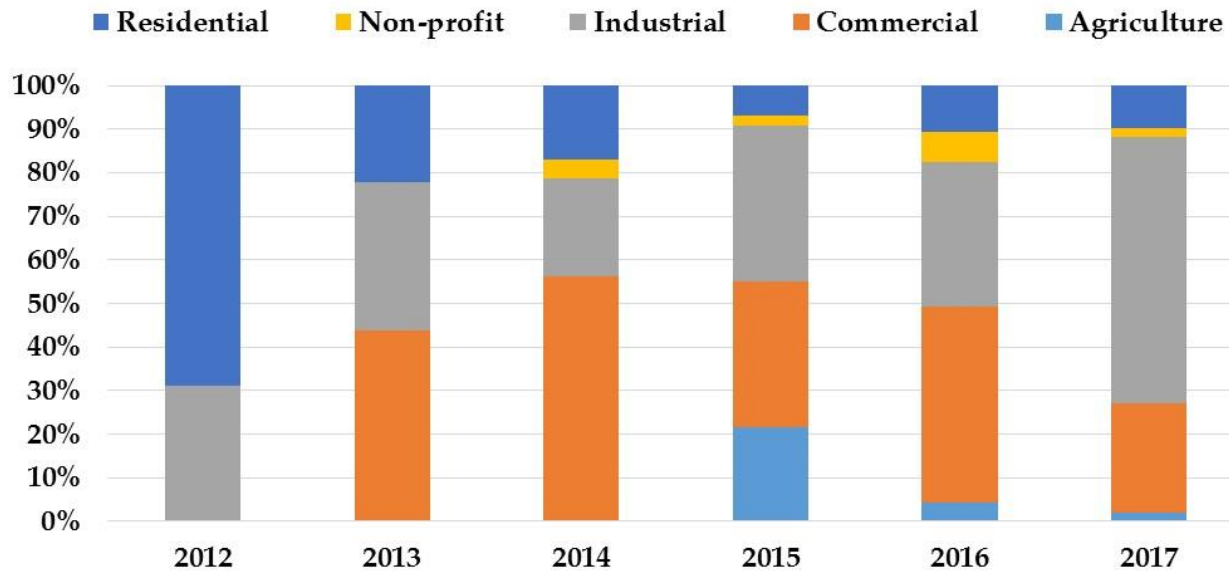
NEEREA- RE projects

- Mainly PV solar systems

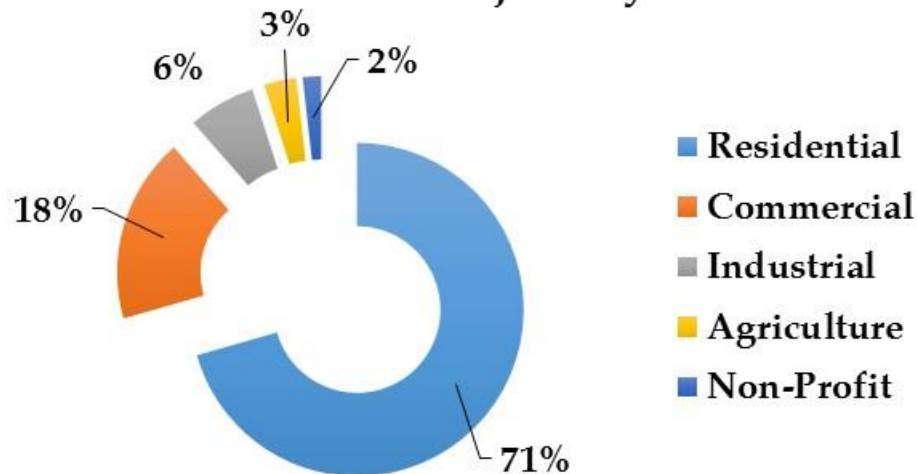


PV Distribution Per Sector-NEEREA

PV capacity per sector



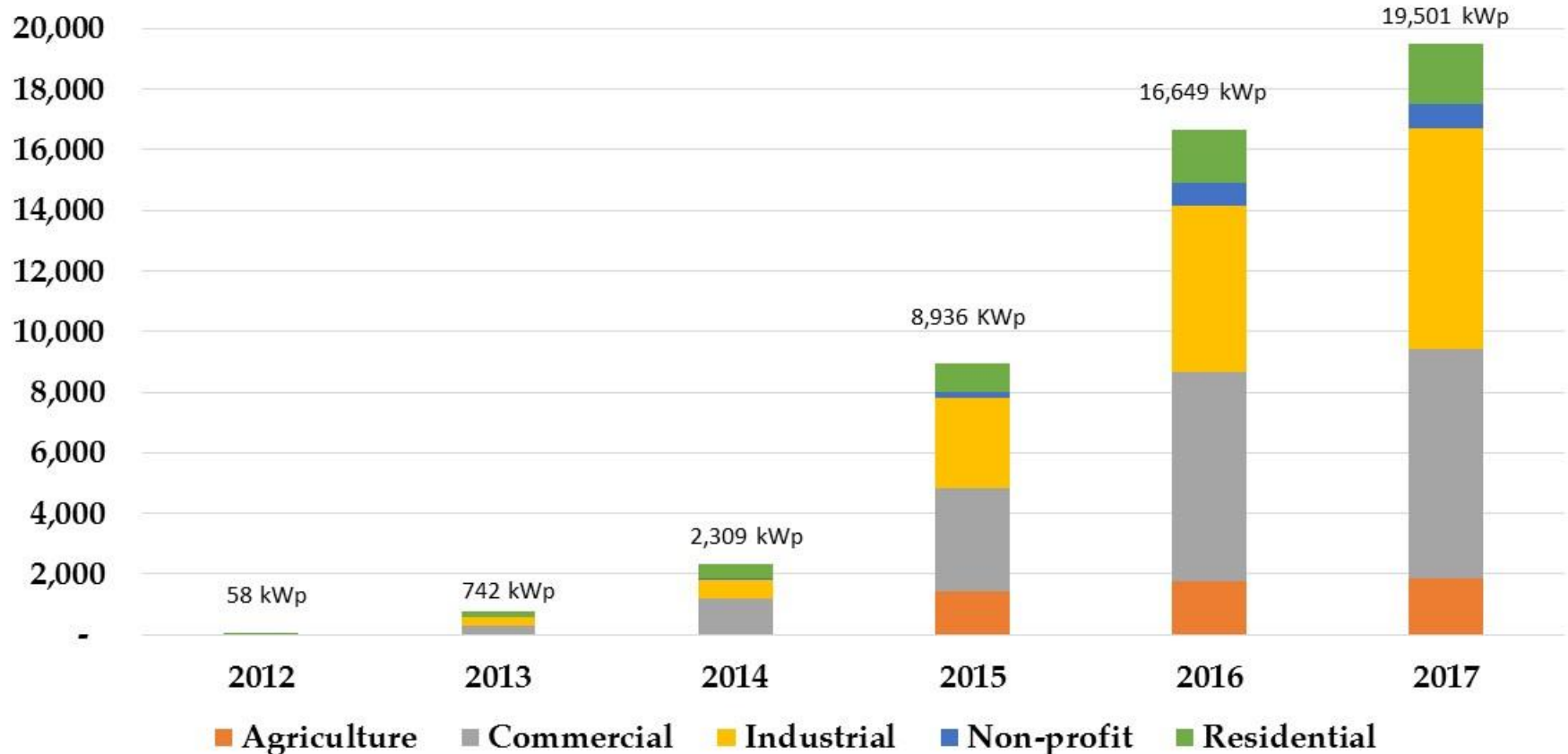
PV Projects by sector



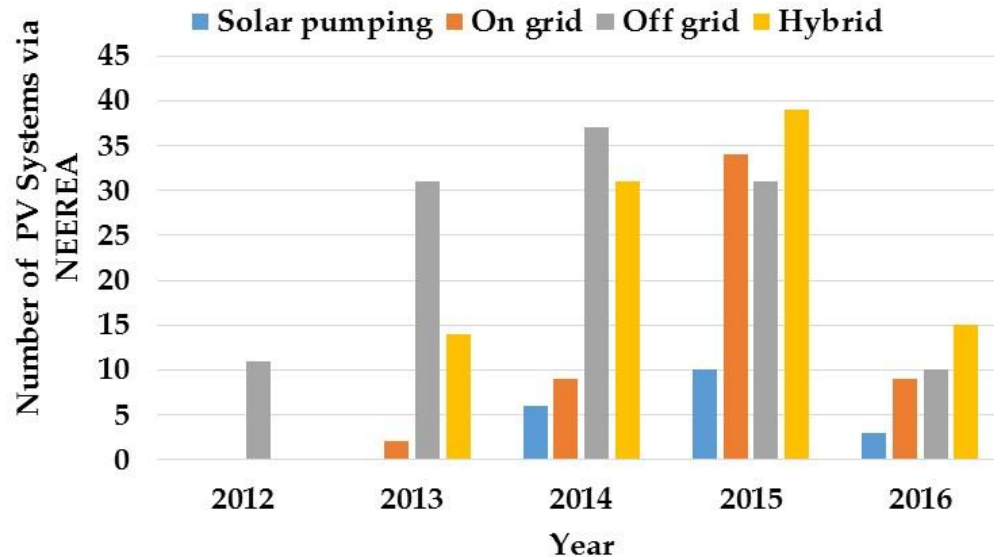
Total number of projects=445

Cumulative PV Per Sector-NEEREA

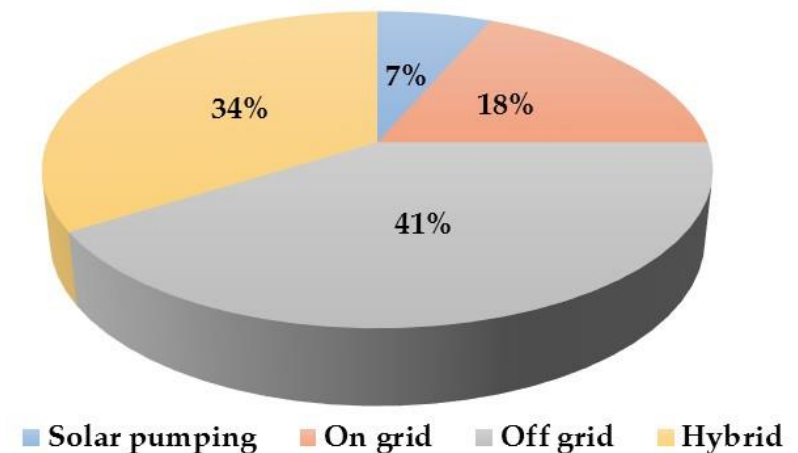
Cumulative PV Capacity by sector



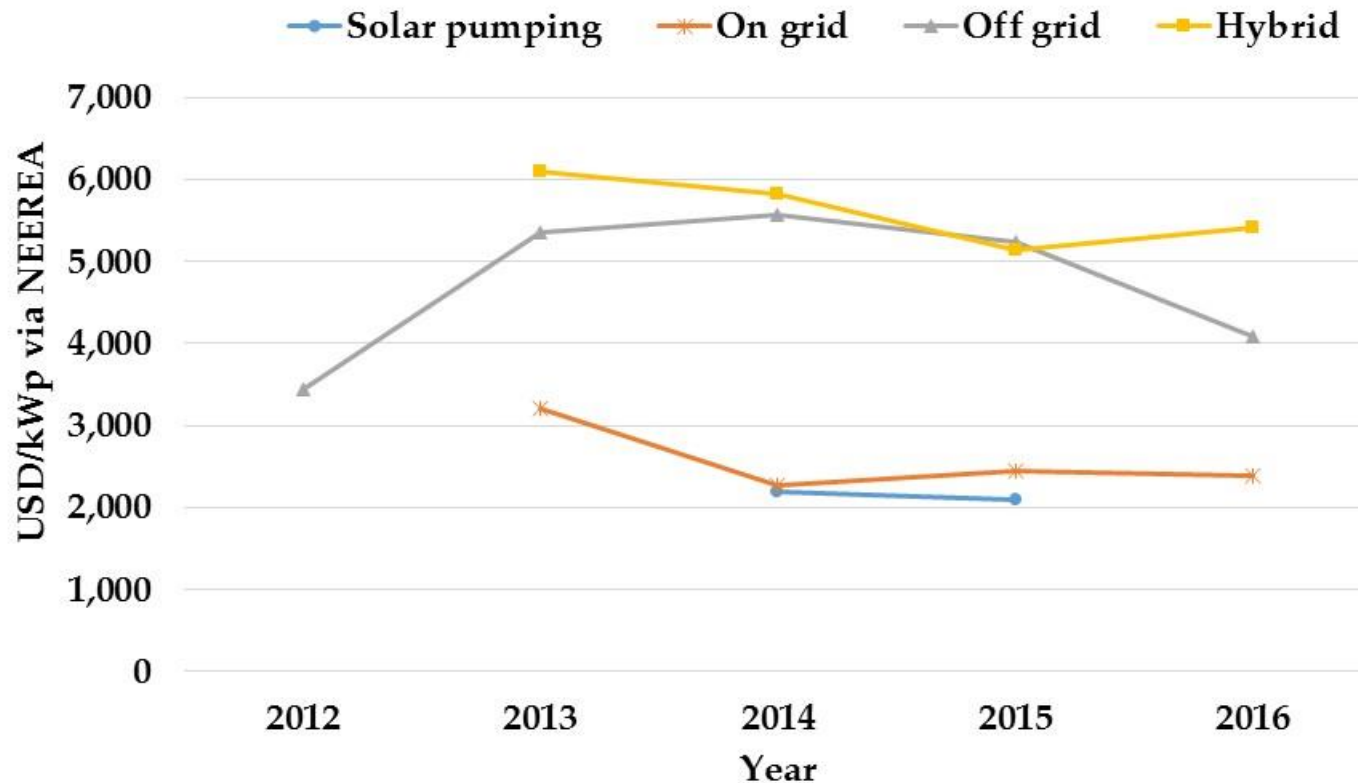
PV Projects per Technology



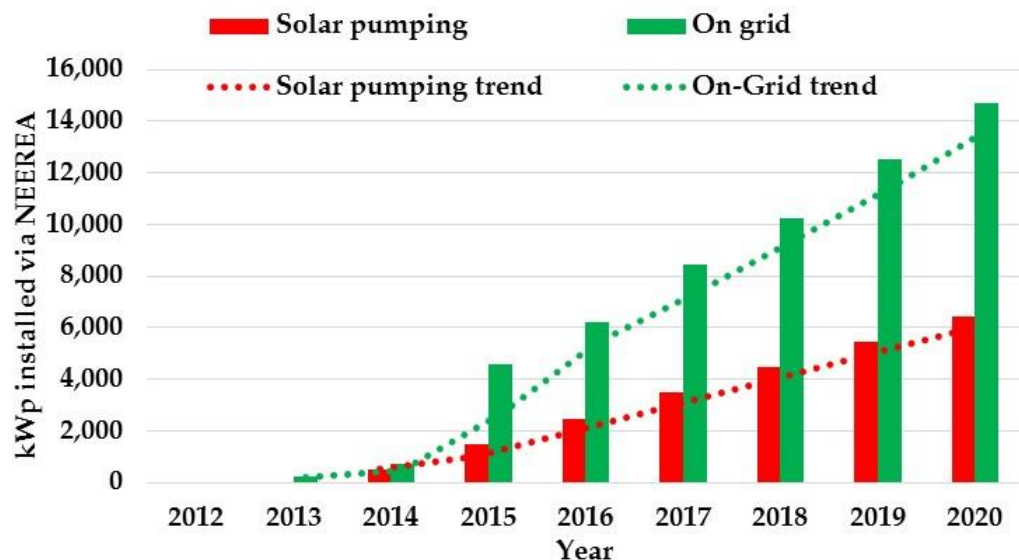
PV projects types via NEEREA 1% loans



Variation of Decentralized PV systems cost/kWp

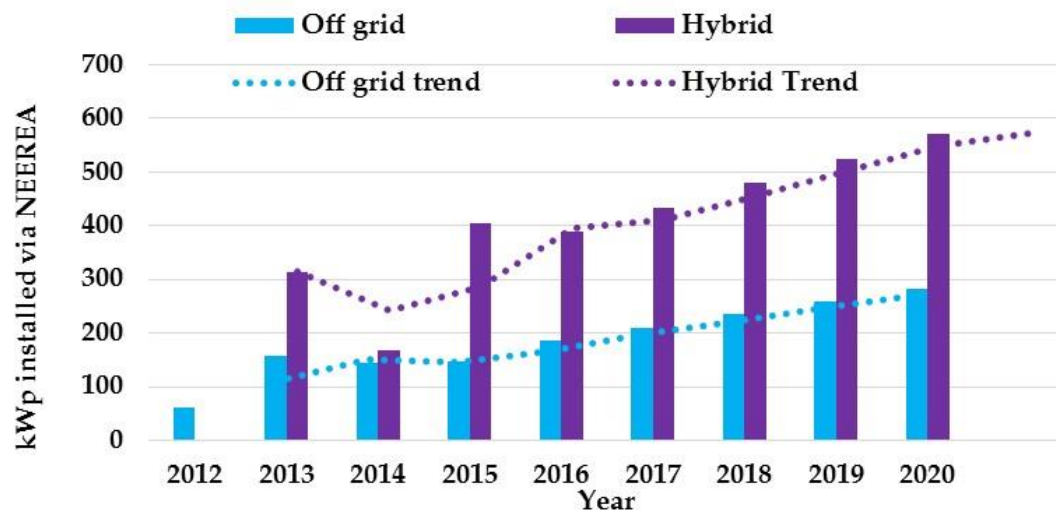


Forecasted Yearly installed PV capacity



Average Expected yearly growth rate:

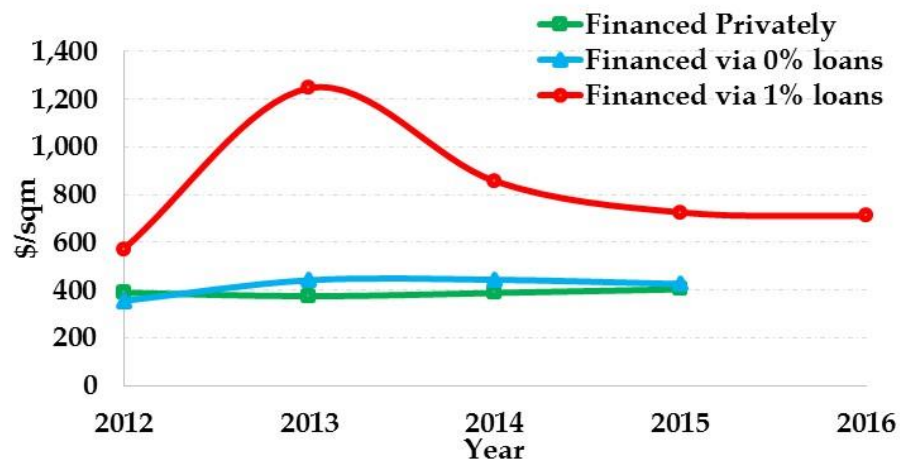
- 26% for On-grid systems
- 35% for Solar pumping
- 14% for off-grid systems
- 10% for hybrid systems



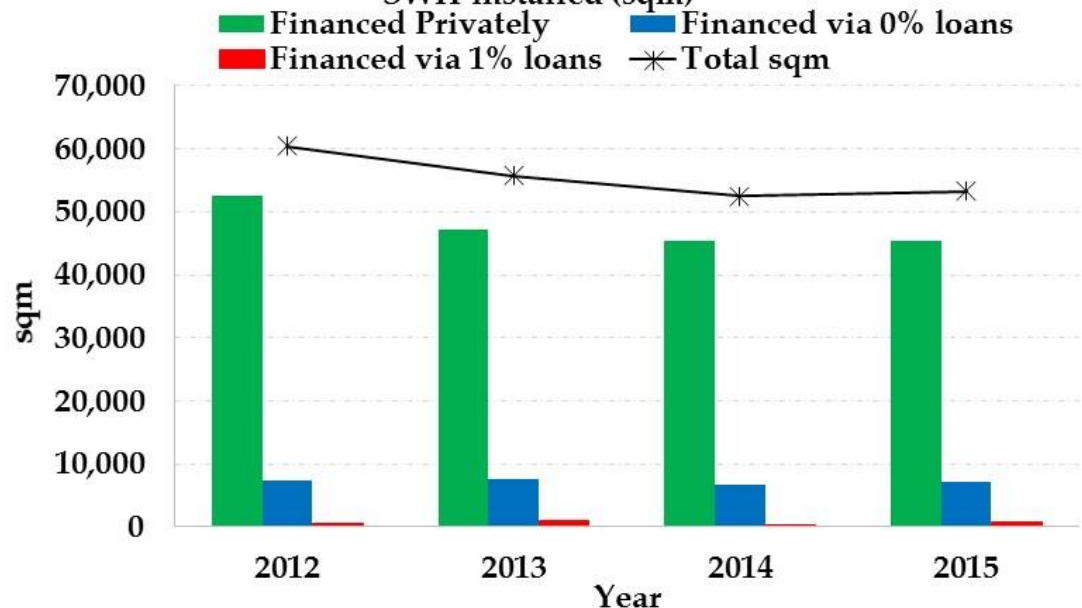
Solar water heaters

- NEEREA loans with 1% interest rate for systems > 5000 \$
- Loans with 0% interest rate for systems < 5000 \$
- 200\$ Grant for systems qualified by the LCEC

SWH system price (\$/sqm)



SWH installed (sqm)



Economic Impact

1. Energy Saving

Installed PV capacity (MWp)	Granted Loans	Energy savings (GWh/y)	Cost Savings/year	CO2 reduction tons/year
19.57	\$ 38,854,191.10	29	\$ 6,104,366.30	47868.66

2. Reduce Use of Private generators=> reducing the cost on the end-user
3. Creating a market momentum
4. NEEREA helped creating more than 10,000 direct and indirect jobs in the sustainable energy sector in Lebanon
5. Number of companies working in SWH rose from 25 in 2010 to more than 170 companies today
6. The number of companies working in solar PV increased from 5 in 2010 to more than 70 today

Table 2.10: RES Graduates Currently Required and Available

	RES labor force	% of professional staff	RES graduates required
Importers	1,921	13	250
Manufacturers	306	9	28
Total	2,227		277
Current pool of RES graduates			1,800

Renewable Energy And Industry

Promoting Industry And Job Creation For Lebanon

A Undp-CEDRO Publication, October 2015

Capacity Building

University	Educational program	Launch year of the RES program or course	No. of course attendees/y
USJ	Master of renewable energy	2011	25
	Joint graduate program between USJ and LU		
	Bachelor of electrical engineering	2010	30 - 35
LU	Bachelor of electrical engineering	2006	30 - 40
	Bachelor of mechanical engineering	2006	30 - 40
	Bachelor of civil engineering	2006	40 - 60
BAU	Bachelor of mechanical engineering	2010	90
	Bachelor of electrical engineering	2010	35
USEK	Master of electrical engineering	2010	26 - 32
	Master of mechanical engineering	2011	30 - 40
	Bachelor of electrical engineering	2011	30
LAU	PRO-GREEN professional or graduate diploma in green technologies	Launched in 2015	24
	Joint graduate program between the LAU and AUB		
AUB	Master of mechanical engineering in applied energy	2007	30
	Ph.D. or master of engineering in electrical and computer engineering	n.d.	30 - 40
NDU	Bachelor of mechanical engineering	n.d.	30

Notes: BAU (Beirut Arab University), NDU (Notre Dame University), n.d. (no data), USEK(Université Saint-Esprit de Kaslik)

- The Lebanese Ministry of Education and Higher Education has recently issued a new decision to include a 60-hour technical course on “solar photovoltaic installations, maintenance and operation” in the curriculum of the third year technical baccalaureate (BT “electrotechnique”).
- A training platform for PV installers is now available in Lebanon:
 - The platform contains different types of solar panels, inverters, and batteries and three main training courses (grid-tied systems, off-grid systems, and high voltage applications)
 - The platform is built thanks to the programme “FASEP Formation Professionnelle” of the French Government. The “Fonds d’Aide au Secteur Privé (FASEP)” is a financial instrument for development assistance implemented by the Directorate General of Treasury in France.

RE Local Components

- Cables
- Transformers
- Structure (steel, aluminum,...)
- EPC
- O&M
- Control and automation
- Inverters
- Tanks for SWH

Thank You

sorina.mortada@lcecp.org.lb